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PATENT

UNITED STATES PATENT APPLICATION

of

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for

FOLDING WORK TABLE

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to a table the legs of which fold, especially a table upon which manual work, such as sawing, is performed.

Description of the Related Art

[0002] United States patent no. 3,646,895, on line 69 of column 1 through line 3 of column 2, describes a Table with Folding Legs as follows:

[0003] "Table **10** when in use is supported by two sets of legs **17** and **21**. With respect to one set **17** of legs, each leg consists of two pivotally joined portions **16** and **18** which are joined by a pin fastener assembly **22**. When the table is folded, as shown in FIGS. 1 and 3, these upper leg portions **18** nest in a position parallel to and alongside the lower leg portions **16**. When this leg set **17** is extended, as shown in FIGS. **2** and **4**, the respective portions **16** and **18** are pivoted into alignment and prevented from pivoting further than 180° by abutting a stop bracket **24** which is fastened to the upper leg portion **18** by using two screws **26**. In the other leg set **21**, each leg **20** is in one piece.

[0004] "The respective leg sets **17** and **21** are pivotally joined together on each side of the table by using a pin fastener assembly **28**, which is located so one set of legs **17** will extend lower than the other sets [*sic*] of legs **21** when the table **10** is folded, and when unfolded and in use, pin fastener assembly **28** holds the legs **16** and **20** together in their strong crossed, diagonal and triangular position."

[0005] The device of patent no. 3,646,895, however, has no device to assist in the unfolding of the legs for the table and also has no wheels or handle to facilitate transporting the table when the legs have been folded.

[0006] The Folding Table of United States patent no. 5,335,604 is very similar to that of patent no. 3,646,895 except that the free ends of the shorter segment of the jointed legs are connected to one another with a bar.

[0007] Thus, as with patent no. 3,646,895, the table of patent no. 5,335,604 has no device to assist in the unfolding of the legs for the table and also has no wheels or handle to facilitate transporting the table when the legs have been folded.

[0008] Although the Worktable of United States patent no. 5,067,535 has a spring **28** to aid the unfolding of the legs for the table and wheels **30** to make transporting the table when the legs have been folded easier, the spring functions over only a limited range; and the legs to which the wheels are attached extend straight beyond the legs, creating a potential physical conflict with the ground or other objects when the wheels are utilized to push or pull the table.

[0009] Lines 37 through 39 in column 4 of patent no. 5,067,535 clarify, "Once the legs are moved past the dead center position, springs **28** serve to open the table the rest of the way." And, on line 66 of column 3 through line 2 of column 4, the patent explains, "Front legs **17** and **19** are each equipped with one caster **30** on their rear sides facing rear legs **18** and **20**. These casters are positioned upwards on legs **17** and **19** such that when the legs are unfolded, they are positioned above the floor on which the table is set."

[0010] Moreover, in the folding operation, legs of the table that are in contact with the surface upon which the table rests do not support some of the weight of the table until the table has been partially folded since lines 22 through 28 of column 4 in patent no. 5,067,535 declare, "When the table is in the partially folded-up position shown in FIG. 5, the user places the rear legs **18** and **20** on the floor, enabling the weight of the table, particularly when the saw or other tool is attached to tool mounting panel **3**, to overcome the restoring force of springs **28**, causing the table to be folded even further."

[0011] Springs are also utilized in the Folding Table for Use with a Table Saw of United States patent no. 6,182,935. Such springs, though, merely serve, according to lines 3 through 5 in column 6, ". . . to bias the actuator plate in the locked and lower position . . ." (Lines 36 through 37 of column 5 explain that the ". . . actuator plate **60** is . . . used to secure the leg mechanism **25** in the open and closed position . . . .") and, as stated in lines 10 through 12 of column 6, ". . . to bias the legs into an open position when the actuator plate is in the released position . . . ."

[0012] Significantly, however, a spring, unlike a piston within a cylinder, does not tend smoothly to resist reverse motion and has more tendency to break loose suddenly.

[0013] United States patent no. 6,240,987 applies to a Tool Supporting Device which has a folding main table and two folding auxiliary tables attached to one another as well as wheels for transporting the folded device.

[0014] The process for folding and unfolding involves significant manipulation, which would render having a tool attached to either the main table or one of the auxiliary tables during the folding process difficult. Furthermore, folding requires that the main table **12** be lifted in order to remove the hooks **42** from the mounting rod **36**; and, as can be determined from FIG. 1 and FIG. 4, the top of the main table is on the bottom after folding. These facts would provide an additional impediment to having a tool attached to the main table during the folding process. And a final impediment is created by the fact that the auxiliary tables **54** are adjacent to the main table **12** with at least one auxiliary table **54** being upside down after folding.

[0015] Although the Collapsible Portable Saw Stand of United States patent no. 6,578,856 can physically support a saw during the folding and unfolding process and possesses wheels to facilitate transportation of the folded stand and saw, it appears that considerable force would have to be used to unfold the stand when the saw is in place.

[0016] A user would have to hold a bar **26** to maintain two legs **20** on an angle while the user pulls a cord attached to a handle **38** in order to slide one end of a platform **18** holding the saw **12** up the two legs **20**.

BRIEF SUMMARY OF THE INVENTION

The present Folding Work Table is an improvement for the Table with Folding Legs of United States patent no. 3,646,895.

[0017] A first facet of the improvement is a power assist actuator (which comprises a housing having a closed first end, a bore with a piston slidably mounted within the bore, and a second end containing an aperture; pressurized fluid—preferably a gas—on a first side of the piston; and a rod having a first end connected to a second side of the piston, an intermediate portion passing through the aperture in the second end of the housing, and a second end) having a first end (which is also the first end of the housing) pivotally connected to the tabletop and a second end (which is also the second end of the rod) pivotally connected to a first one-piece leg. Preferably, a second power assist actuator also has a first end pivotally connected to the tabletop

and a second end pivotally connected to a second one-piece leg. (The orientation of either or both power assist actuators can be reversed, *i.e.*, the first end of a power assist actuator can be pivotally connected to a one-piece leg while the second end is pivotally connected to the tabletop.)

[0018] In unfolding the table, the vast majority of the weight of the tabletop and any item attached to the tabletop is borne by the one-piece legs while the power assist actuators push the tabletop away from the free end of each one-piece leg, *i.e.*, the end that is not attached to the tabletop. This allows the two two-piece legs (which have two pivotally attached segments) to unfold (a process which involves the rotational movement away from the tabletop of a second end of the segment which has a first end pivotally attached to the tabletop and also includes the second segment rotating from an initial position where such second segment is substantially parallel to the first segment and passes substantially adjacent to the first end of the first segment to a position substantially one hundred and eighty degrees from such first position) and, consequently, enables the free ends of the two-piece legs to be placed on a support surface, such as a floor, thereby rotating the tabletop to a horizontal position.

[0019] During the folding of the table, the power assist actuators aid in preventing the tabletop and any attached tool from too rapidly rotating toward the free ends of the two-piece legs.

[0020] A second facet of the improvement involves the attachment of a wheel near the free end of each two-piece leg; bending the free end of each two-piece leg away from the tabletop; and having the angle of the bend, the dimensions of the two-piece legs, and the dimensions and point of attachment for each wheel such that the free ends of the two-piece legs will hold the wheels above the support surface when the two-piece legs have been unfolded to support the tabletop while having such free ends higher than the bottom of the wheels and providing ground clearance for the free end that is substantially equal to the radius of the wheel near that free end when the table has been folded.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OFTHE DRAWING

[0021] FIG. 1 is a perspective view of the first embodiment of the unfolded Folding Work Table.

[0022] FIG. 2 is a lateral view of the first embodiment of the unfolded Folding Work Table.

[0023] FIG. 3 is an end view of the first embodiment of the unfolded Folding Work Table.

[0024] FIG. 4 illustrates, in a cutaway view, a power assist actuator.

[0025] FIG. 5 depicts a pin utilized to maintain either or both two-piece legs in an unfolded position.

[0026] FIG. 6 depicts a pin utilized to maintain either or both two-piece legs in a folded position.

[0027] FIG. 7 is a perspective view of the second, wheeled, embodiment of the unfolded Folding Work Table.

[0028] FIG. 8 is a lateral view of the second, wheeled, embodiment of the Folding Work Table in a partially folded state with a tool attached to the tabletop.

[0029] FIG. 9 is a lateral view of the second, wheeled, embodiment of the Folding Work Table in a completely folded state with a tool attached to the tabletop.

DETAILED DESCRIPTION OF THE INVENTION

[0030] A first embodiment of the Folding Work Table includes, as illustrated in FIG. 1, FIG. 2, and FIG. 3, two one-piece legs **1**, **2**. A first end **3** of the first one-piece leg **1** is pivotally attached to a tabletop **4** having a first end **5**, a second end **6**, a first side **7**, and a second side **8**. Similarly, a first end **9** of the second one-piece leg **2** is pivotally attached to the tabletop **4** but at a point of attachment **10** which is closer to the second side **8** of the tabletop **4** than is the point of attachment **11** for the first end **3** of the first one-piece leg **1**.

[0031] Two two-piece legs **12**, **13** also are included. A first end **14** of a first segment **15** of the first two-piece leg **12** is pivotally attached to the tabletop **4**. A second end **16** of the first segment **15** of the first two-piece leg **12** is pivotally attached to a first end **17** of a second segment **18** of the first two-piece leg **12**. Likewise, a first end **19** of a first segment **20** of the second two-piece leg **13** is pivotally connected to the tabletop **4** but at a point of attachment **21** which is closer to the second side **8** of the tabletop **4** than is the point of attachment **22** for the first end **14** of the first segment **15** of the first two-piece leg **12**. A second end **23** of the first segment **20** of the second two-piece leg **13** is pivotally attached to a first end **24** of a second segment **25** of the second two-piece leg **13**.

[0032] Also, the point of attachment **11** for the first end **3** of the first one-piece leg **1** is closer to the first end **5** of the tabletop **4** than is the point of attachment **22** for the first end **14** of the first segment **15** of the first two-piece leg **12**; and the point of attachment **10** for the first end **9** of the second one-piece leg **2** is closer to the first end **5** of the tabletop **4** than is the point of attachment **21** for the first end **19** of the first segment **20** of the second two-piece leg **13**.

[0033] Furthermore, the first one-piece leg **1** is pivotally attached to the second segment **18** of the first two-piece leg **12** at a point **26** intermediate between the first end **17** and the second or free end **27** of the second segment **18**; and the second one-piece leg **2** is pivotally attached to the second segment **25** of the second two-piece leg **13** at a point **28** intermediate between the first end **24** and the second or free end **29** of the second segment **25**.

[0034] The point of attachment **11** for the first end **3** of the first one-piece leg **1** is preferably near the first side **7** of the tabletop **4**, and the point of attachment **10** for the first end **9** of the second one-piece leg **2** is preferably near a second side **8** of the tabletop **4**.

[0035] As indicated above, when either two-piece leg **12, 13** is folded, the first segments **15, 20** are substantially adjacent to the bottom **30** of the tabletop **4** with such first segments **15, 20** substantially parallel to their respective second segments **18, 25** and having such second segments **18, 25** passing substantially adjacent to the first ends **14, 19** of their respective first segments **15, 20**. As the two-piece legs **12, 13** unfold, the second ends **16, 23** of the respective first segments **15, 20** rotationally move away from the bottom **30** of the tabletop **4**; and the second segments **18, 25** rotate approximately one hundred eighty degrees in reference to their respective first segments **15, 20**.

[0036] Either the second end **16, 23** of the first segment **15, 20** or the first end **17, 24** of the second segment **18, 25** or both may extend beyond the point of pivotal connection **31, 32** of the second end **16, 23** of the first segment **15, 20** and the first end **17, 24** of the second segment **18, 25**. Preferably, attached either to the top **33, 34** of the first segment **15, 20** of at least one, and preferably both, of the two-piece legs **12, 13** on the portion **35, 36**, if any, of such first segment **15, 20** that extends away from the first end **14, 19** of the first segment **15, 20** beyond the point of pivotal connection **31, 32** of the second end **16, 23** of the first segment **15, 20** and the first end **17, 24** of the second segment **18, 25** or to the top **37, 38** of the second segment **18, 25** of at least one, and preferably both, of the two-piece legs **12, 13** on the portion **301, 302**, if any, of such

second segment **18, 25** that, when the two-piece leg **12, 13** has been unfolded, extends away from the second end **27, 29** of the second segment **18, 25** beyond the point of pivotal connection **31, 32** of the second end **16, 23** of the first segment **15, 20** and the first end **17, 24** of the second segment **18, 25** is a stop **39, 40**. If the stop **39, 40** is attached to the top **33, 34** of the first segment **15, 20**, such stop **39, 40** extends over the second segment **18, 25** so that such second segment **18, 25** cannot rotate more than approximately one hundred eighty degrees from the folded position of such second segment **18, 25**. Similarly, if the stop **39, 40** is attached to the top **37, 38** of the second segment **18, 25**, such stop **39, 40** extends over the first segment **15, 20** so that such second segment **18, 25** cannot rotate more than approximately one hundred eighty degrees from the folded position of such second segment **18, 25**. (Alternatively, if the stop **39, 40** is attached to the second end **16, 23** of the first segment **15, 20** or the first end **17, 24** of the second segment **18, 25** on the opposite side of the point of pivotal connection **31, 32**, such stop **39, 40** must be attached to the bottom **201, 202** of the first segment **15, 20** of at least one, and preferably both, of the two-piece legs **12, 13** or to the bottom **203, 204** of the second segment **18, 25** of at least one, and preferably both, of the two-piece legs **12, 13**, in order to accomplish its function of limiting the rotation of the second segment **18, 25** of at least one, and preferably both, of the two-piece legs **12, 25** with respect to the first segment **15, 20** of such two-piece leg or legs **12, 25**.)

[0037] As discussed above, a first major improvement provided by the present invention to folding tables of this type is the employment of a power assist actuator **41**.

[0038] And, as seen in FIG. 4 and explained above, the power assist actuator **41** comprises a housing **42** having a closed first end **43**, a bore **44** with a piston **45** slidably mounted within the bore **44**, and a second end **46** containing an aperture **47**; pressurized fluid **48**—preferably a gas—on a first side **49** of the piston **45**; and a rod **51** having a first end **52** connected to a second side **53** of the piston **45**, an intermediate portion **54** passing through the aperture **47** in the second end **46** of the housing **42**, and a second end **55**.

[0039] The power assist actuator **41** has, as indicated above, a first end **56** (which is also the first end **43** of the housing **42**) pivotally connected to the tabletop **4** and a second end **57** (which is also the second end **55** of the rod **51**) pivotally connected to a first one-piece leg **1**. Preferably, a second power assist actuator **58** also has a first end **59** pivotally connected to the tabletop **4** and

a second end **60** pivotally connected to a second one-piece leg **2**. (The orientation of either or both power assist actuators **41**, **58** can, however, be reversed, *i.e.*, the first end **56**, **59** of a power assist actuator **41**, **58** can be pivotally connected to a one-piece leg **1**, **2** while the second end **57**, **60** is pivotally connected to the tabletop **4**.)

[0040] Then, as explained above, the power assist actuators **41**, **58** facilitate the folding and unfolding of the table **100**.

[0041] Several further subsidiary options also exist.

[0042] In a first such option, a screw **61** is threadably mounted in the bottom **62** of one of the one-piece legs **1**, **2** in order to further stabilize the table **100** when it is placed upon a somewhat uneven surface.

[0043] Also, one or more apertures **63** preferably exist in the first segment **15**, **20** of one or both two-piece legs **12**, **13**; and one or more corresponding apertures **64** exist in the second segments **18**, **25** of such two-piece leg or legs **12**, **13** with such aperture **63** and corresponding apertures **64** being so located that, when the two-piece leg **12**, **13** is unfolded, at least one aperture **63** and one corresponding aperture **64** of such leg **12**, **13** are so aligned that a pin **65** can, as illustrated in FIG. 5, be inserted in such aligned aperture **63** and corresponding aperture **64** to facilitate maintaining the two-piece leg **12**, **13** in the unfolded position and, when the two-piece leg **12**, **13** is folded, at least one aperture **63** and one corresponding aperture **64** of such leg **12**, **13** are so aligned that a pin **65** can, as shown in FIG. 6, be inserted in such aligned aperture **63** and corresponding aperture **64** to facilitate maintaining the two-piece leg **12**, **13** in the folded position.

[0044] Additionally, either the first one-piece leg **1** or the first two-piece leg **12** can be closer to the first side **7** of the tabletop **4**; and either the second one-piece leg **2** or the second two-piece leg **13** can be closer to the second side **8** of the tabletop **4**.

[0045] And, in order further to add stability to the table **100**, a crosspiece **66** is optionally attached between the similar enumerated components in any or all of the following sets: the first segments **15**, **20** of the two-piece legs **12**, **13**; the second segments **18**, **25** of the two-piece legs **12**, **13** below the points of pivotal attachment **26**, **28**; and the one-piece legs **1**, **2** below the points of pivotal attachment **26**, **28**. (Of course, locating a crosspiece **66** in some areas may preclude either the one-piece legs **1**, **2** or the two-piece legs **12**, **13** from being completely parallel to one

another or from touching the bottom **30** of the tabletop **4** along their entire length when in the folded position; this would, though, simply be one factor for consideration and not necessarily a deterrent to the use of a crosspiece **66**.

[0046] The second major improvement provided by the present invention to folding tables of this type is, as portrayed in FIG. 7, FIG. 8, and FIG. 9, the utilization of a first wheel **67** rotably connected to the second segment **18** of the first two-piece leg **12** near the free end **27** of the second segment **18** of the first two-piece leg **12** and a second wheel **68** rotatably connected to the second segment **25** of the first two-piece leg **12** near the free end **29** of the second segment **25** of the second two-piece leg **13**. Near the point of attachment **69** of the first wheel **67** to the second segment **18** of the first two-piece leg **12**, the second segment **18** of the first two-piece leg **12** is bent away from the tabletop **4**, making a first angle α with respect to such second segment **18**. Similarly, near the point of attachment **70** of the second wheel **68** to the second segment **25** of the second two-piece leg **13**, the second segment **25** of the second two-piece leg **13** is bent away from the tabletop **4**, making a second angle β with respect to such second segment **25**. Preferably, the first angle α and the second angle β are substantially equal to one another.

[0047] The angles α and β of such bends; the dimensions of the first and second two-piece leg **12, 13**; and the points of attachment **69, 70** of the first and second wheel **67, 68** as well as the dimensions of such wheels **67, 68** are, as discussed above, selected such that the free ends **27, 29** of the second segments **18, 25** of the two-piece legs **12, 13** will, as depicted in FIG. 7, hold the wheels **67, 68** above a surface supporting the table **100** when the two-piece legs **12, 13** have been unfolded to support the tabletop **4** while, as shown in FIG. 9, having such free ends **27, 29** higher than the bottoms **71, 72** of the wheels **67, 68** and providing ground clearance for each free end **27, 29** that is preferably substantially equal to the radius **73, 74** of the wheel **67, 68** near such free end **27, 29** when the table **100** has been folded. (For purposes of illustration, a tool **75** is shown attached to the tabletop **4** in FIG. 8 and FIG. 9.)

[0048] When there are no wheels **67, 68**, the free ends **27, 29** of the second segments **18, 25** of the two-piece legs **12, 13** as well as the free or second ends **76, 77** of the first and second one-piece legs **1, 2** are preferably bent outward in order to add additional stability to the table **100**. When there are wheels **67, 68**, the free ends **76, 77** of the first and second one-piece legs **1, 2** are bent outward sufficiently to avoid the wheels **67, 68**.

[0049] Furthermore, when a one-piece leg **1**, **2** is inside the two-piece legs **12**, **13**, either there can be no axle **78** extending between the wheels **67**, **68** or such one-piece leg must be shaped to avoid an axle **78** extending between the wheels **67**, **68** when the table **100** has been folded.

[0050] Especially when wheels **67**, **68** are employed, it is preferable to have a handle **79** attached to the tabletop **4** near a first end **5** of such tabletop **4**. And, using any technique that is well known in the art, the handle **79** can preferably be extended from such first end **5** and locked into place. One example of such a well-known technique is having a tube **80** attached to the bottom **30** of the tabletop **4** with the handle **79** slidably mounted with the tube **80** in such a manner that a first end **81** of the handle **79** extends from a first end **82** of the tube **80** past the first end **5** of the tabletop **4** while a second end **83** of the handle **79** extends from a second end **84** of the tube **80** in substantially the opposite direction, *viz.*, under the tabletop **4**; a stop **85** attached to the second end **83** of the handle **79** precludes the second end **83** of the handle **79** from entering the tube **80** so that the handle **79** cannot slide from the tube **80**; and a thumb screw **86** is mounted within a threaded aperture **87** of the tube **80** for locking the handle **79** in position when such handle projects a desired distance from the tube **80**.

[0051] As used herein, the terms "substantially" and "approximately" indicate that one skilled in the art would consider the value modified by such terms to be within acceptable limits for the stated value. Also as used herein the term "preferable" or "preferably" means that a specified element or technique is more acceptable than another but not that such specified element or technique is a necessity.